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Abstract

THE INITIATION OF A NATIONAL NUCLEAR POWER PROGRAMME

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This Paper discusses some of the practical problems facing a country about to instal its first nuclear power reactor. It is assumed that the country concerned is one which normally imports heavy plant, and will expect to make its first power reactor the subject of commercial contracts with foreign suppliers. A great deal of preparatory work needs to be carried out before such contracts can be signed, and it is the object of the present Paper to survey this work and point out some of the difficulties that arise.

For a number of reasons a country may decide to build a nuclear power station whether or not it is clearly the most economic form of generation. Once built, however, the station must be run in such a way that the overall operating cost of the entire interconnected electricity system is minimised. Therefore a long-term study of the national power requirements must be made before the optimum size of station can be calculated.

It will be recognised that out of all possible reactor systems only very few can be regarded as "proved". The Paper summarises the practical experience of design and operation of the major reactor types, and discusses the potentialities of some of the systems still only in the prototype stage. Comments are made on the principal areas of uncertainty.

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The choice of site follows normal thermal generation practice with the addition of certain special requirements. National regulations for population exclusion, the emission and disposal of radioactive materials, third party nuclear insurance and other legislative matters, require drawing up after study of national and international experience elsewhere.

Once the basic decisions to proceed have been taken, an administrative organisation must be set up to manage the project, reinforced as required by consultants and specialists. This group must set themselves target dates for completing the preliminary work which is the purchaser's responsibility, followed by the placing of the main construction contracts and the achievement of full power generation by a certain date.

The ideal Invitation to Tender includes a clear Specification which ensures that the bids received may be properly evaluated and compared. The purchaser should propose Conditions of Contract which will lead to the minimum delay in negotiating the final contracts. A good contract is satisfactory to both parties, and in the nuclear field the purchaser should understand what a reactor designer can and cannot be reasonably expected to guarantee in the present state of the art.

The comparison of a number of tenders for widely different reactor systems raises some interesting problems. It is desirable to establish as early as possible the economic ground rules to be used in making an economic comparison, which may not lead to the choice of the lowest capital cost system. Energy cost may not even be the principal criterion, as the calculations may be "weighted" by considerations peculiar to the purchaser, such as the degree of local industrial participation desired. These considerations should be mentioned in the Invitation.

The coordination and supervision of work on site follow the placing of the principal contracts.